

PROCLOEON VIRIDOCULARIS (EPHEMEROPTERA: BAETIDAE) FROM MICHIGAN AND PENNSYLVANIA, NEW RANGE EXTENSIONS WITH COMMENTS ON THE SPECIES¹

R.D. Waltz², James B. Munro³

ABSTRACT: *Procloeon viridocularis* is reported for the first time from both Michigan and Pennsylvania. These collections are also the first reports of this species outside the southeastern United States. Previously, this species was known only from Alabama, Florida, Georgia, Mississippi and South Carolina. The larva of *Procloeon viridocularis* is distinct, if not unique, among Nearctic *Procloeon* based on a combination of characters including elongate claws, simple gills, long, narrow maxillary palps, and terminal segment of the labial palps greatly expanded. The larvae are similar to larvae of the genus *Pseudocentropiloides*. A synoptic comparison and contrast of the larvae of this species with *Pseudocentropiloides* is provided.

While conducting ecological studies of mayfly drift and periodicity, two unusual larval exuviae of *Procloeon* Bengtsson were collected by one of us (JBM) from Blooming Grove Creek, Pike County, Pennsylvania, August 10, 1993. Independently, the senior author encountered two larvae of the same type from Michigan, Cheboygen Co., Lake Huron, Grassy Bay, near shore area, May 18, 1992, collected as part of ongoing studies of the National Biological Service, Great Lakes Science Center. The larvae and larval exuviae were characterized by elongate claws greater than one-half the length of their respective tarsi, greatly expanded terminal segments of the labial palps, and each maxilla bearing a narrow, much elongated (compared to the majority of *Procloeon* species) palp extending well beyond the galealacinea.

These larvae and larval exuviae were identified as *Procloeon viridocularis* (Berner) based on comparisons with published descriptions (Berner 1940) and comparisons with previously identified material in the senior author's collection from the southeastern United States. This species has been reported from Alabama, Florida, Georgia, and Mississippi (Berner and Pescador 1988) and South Carolina (Unzicker and Carlson 1982: p. 3.85). The discovery of *P. viridocularis* from the northernmost county of the lower peninsula of Michigan and from northeastern Pennsylvania greatly extends the known northern range of this species. It may eventually be found throughout much of the east (equal to northeast + southeast sensu McCafferty and Waltz 1990).

This widespread, but apparently uncommon, species was originally described

¹ Received August 31, 1995. Accepted October 2, 1995.

² IDNR, Division of Entomology and Plant Pathology, 402 West Washington, Room W-290, Indianapolis, IN 46204.

³ East Stroudsburg University, Department of Biological Sciences, East Stroudsburg, PA 18301.

in *Centropetium* Eaton as both larvae and adults by Berner (1940) and later transferred to *Procloeon* (McCafferty and Waltz 1990). Some workers have brought to the attention of the senior author the phenotypic similarities of the larva of *P. viridocularis* with *Pseudocentropetiloidea* Jacob, noting especially the claw, gill, and labial palp characters as being very similar. However, *P. viridocularis* lacks the identifying synapomorphies which would place it in *Pseudocentropetiloidea*, including lack of a v-shaped notch at the anterior margin of the labrum, lack of a characteristically modified maxilla, and lack of shortened glossae and paraglossae (see Waltz and McCafferty 1989). The larva of *Procloeon viridocularis* is distinctive, if not unique, among North American *Procloeon* in possessing elongate claws which exceed one-half the length of their respective tarsi, possessing greatly expanded terminal segments of the labial palps, combined with the possession of maxillae with an elongate, two-segmented palp which extends well beyond the apex of the galealacinea. Like other *Procloeon* species, larvae of this species possess caudal filaments with lateral setae present to the tips of the filaments, and have the mandible incisors united beyond half way from the base on at least one mandible.

Berner and Pescador (1988) provided an excellent account of the habitats of *P. viridocularis* in the southeastern United States. In the southeast, larvae of this species apparently prefer sandy bottomed streams with moderate current where they may be found in still pockets behind rocks or at the base of rooted plants.

The collection site for *P. viridocularis* in Michigan was uncharacterized other than as a near shore site in Lake Huron.

The site from which the Pennsylvania material is taken is located in Blooming Grove Creek, a clean, clear-water, third order stream. This dominantly free stone stream is generally characterized by substrate boulders with a low degree of embeddedness. Pools and riffles provide a variety of alternative microhabitats. The stream is fed by swamp water outflows maintaining a pH of around 6.14 (Ersbak 1993). Low alkalinity 4.9 mg/l (CaCO_3), low total hardness 18.8 mg/l (CaCO_3), and average temperatures of 20° C ranging from a low of 1.9° C in February to a high of 23.0° C in September (Ersbak 1993) summarize the physical and chemical parameters of the site.

The habitat described above appears to differ somewhat from that described for this species by Berner and Pescador (1988). However, one rather large pool, with sandy substrate located approximately seven meters upstream from the sampling site, matched closely the characteristics of the southeastern habitat for this species described by Berner and Pescador (1988). The pool did not exceed 30 cm in depth and was bordered by an emergent bur reed, *Sparganium chlorocarpum*. It is possible that this pool represents the habitat of this species in Pennsylvania, rather than the more generally distributed boulder type of habitat occurring throughout most of the stream.

ACKNOWLEDGMENTS

We thank the Blooming Grove Hunting and Fishing Club for allowing one of us (JBM) to study the stream site from which some of the specimens in this report were collected. We thank Pat Hudson, National Biological Service, Great Lakes Science Center, for providing the Michigan material cited in this report.

LITERATURE CITED

- Berner, L. 1940. Baetinae mayflies from Florida (Ephemeroptera). *Florida Entomol.* 23: 33-45, 49-62.
- Berner, L. and M. L. Pescador. 1988. *The Mayflies of Florida, Revised Edition*. University Presses of Florida, Gainesville. 415 pp.
- Ersbak, K. 1993. Fishery management report for the Blooming Grove Hunting and Fishing Club. Hawley, Pennsylvania. 66 pages.
- McCafferty, W.P. and R.D. Waltz. 1990. Revisionary synopsis of the Baetidae (Ephemeroptera) of North and Middle America. *Trans. Am. Entomol. Soc.* 116: 769-799.
- Unzicker, J.D. and P. Carlson. 1982. Ephemeroptera, pp.3.1-3.97. *In* A.R. Brigham, W.U. Brigham, and A. Gniska, eds. *Aquatic insects and oligochaetes of North and South Carolina*. Midwest Aquatic Enterprises, Mahomet, Illinois.
- Waltz, R.D. and W.P. McCafferty. 1989. New species, redescription, and cladistics of the genus *Pseudocentropiloides* (Ephemeroptera: Baetidae). *J. New York Entomol. Soc.* 97: 151-158.